

WHAT IS CLAIMED IS:

1. A filter device comprising:

a bag-like filter for separating particles of impurities contained in a liquid to be filtered;

a protecting member made of a rigid body for protecting the filter and in a shape of a cylinder having a bottom;

a housing for accommodating the filter and the protecting member so that opening portions of the filter and the protecting member are oriented downward, the housing including a housing main body having a cylindrical portion and a housing cover mounted to an end portion of the cylindrical portion of the housing main body, wherein the cylindrical portion having an inlet disposed below the opening portions for leading the liquid to be filtered inside and an outlet disposed above the opening portions for allowing the liquid filtered by the filter to flow outside;

a deposit recovery tank for recovering particles below an opening end of the filter, the particles having higher specific gravity than the liquid to be filtered out of the particles of the impurities separated by the filter; and

a seal for sealing an annular gap between an outer peripheral face of the protecting member and an inner peripheral face of the housing in the vicinity of the

opening end of the filter,

wherein a support member is mounted in the housing main body, a position restricting portion is provided to the housing cover, and vertical positioning of the filter and the protecting member is carried out by using the support member and the position restricting portion, and

a tip end portion of a cylindrical portion of the protecting member is brought into contact with the position restricting portion.

2. A filter device comprising:

a bag-like filter for separating particles of impurities contained in a liquid to be filtered;

a protecting member made of a rigid body for protecting the filter;

a housing for accommodating the filter and the protecting member so that an opening portion of the filter is oriented downward, the housing having an inlet disposed below the opening portion for leading the liquid to be filtered inside and an outlet disposed above the opening portion for allowing the liquid filtered by the filter to flow outside;

a deposit recovery tank for recovering particles below an opening end of the filter, the particles having higher specific gravity than the liquid to be filtered out of the particles of the impurities separated by the filter; and

a seal for sealing an annular gap between an outer peripheral face of the protecting member and an inner peripheral face of the housing in the vicinity of the opening end of the filter.

3. A filter device according to claim 1 or 2 and further comprising a sleeve fitted with an inner periphery of the housing, wherein the seal forms seal faces respectively on the outer peripheral face of the protecting member and an inner peripheral face of the sleeve.

4. A filter device according to claim 3, wherein a taper for leading the protecting member to a predetermined mounting position in mounting the protecting member in the housing is provided to an end portion of the sleeve.

5. A filter device according to any one of claims 1 to 4, further comprising a seal portion for sealing a path of the liquid to be filtered entering a gap between an inner peripheral face of the protecting member and an outer peripheral face of the filter.

6. A filter device comprising:

a bag-like filter for separating particles of impurities contained in a liquid to be filtered;

a protecting member made of a rigid body for protecting the filter and in a shape of a cylinder having a bottom;

a housing for accommodating the filter and the

protecting member so that opening portions of the filter and the protecting member are oriented downward, the housing including a housing main body having a cylindrical portion and a housing cover mounted to an end portion of the cylindrical portion of the housing main body, wherein the cylindrical portion having an inlet disposed below the opening portions for leading the liquid to be filtered inside and an outlet disposed above the opening portions for allowing the liquid filtered by the filter to flow outside; and

a deposit recovery tank for recovering particles below an opening end of the filter, the particles having higher specific gravity than the liquid to be filtered out of the particles of the impurities separated by the filter;

wherein a support member is mounted in the housing main body, a position restricting portion is provided to the housing cover, and vertical positioning of the filter and the protecting member is carried out by using the support member and the position restricting portion, and

a tip end portion of a cylindrical portion of the protecting member is brought into contact with the position restricting portion.

7. A filter device according to claim 6, wherein the position restricting portion has an area with which the whole tip end portion of the cylindrical portion of

the protecting member is brought into contact.

8. A filter device comprising:

a bag-like filter for separating particles of impurities contained in a liquid to be filtered;

a protecting member made of a rigid body for protecting the filter and in a shape of a cylinder having a bottom;

a housing for accommodating the filter and the protecting member so that opening portions of the filter and the protecting member are oriented downward, the housing including a housing main body having a cylindrical portion and a housing cover mounted to an end portion of the cylindrical portion of the housing main body, wherein the cylindrical portion having an inlet disposed below the opening portions for leading the liquid to be filtered inside and an outlet disposed above the opening portions for allowing the liquid filtered by the filter to flow outside; and

a deposit recovery tank for recovering particles below an opening end of the filter, the particles having higher specific gravity than the liquid to be filtered out of the particles of the impurities separated by the filter,

wherein a support member is mounted in the housing main body, a position restricting portion is provided to the housing cover, and vertical positioning of the filter and the protecting member is carried out by using

the support member and the position restricting portion,  
a cross-shaped handle having longwise and crosswise lengths each substantially equal to a diameter of the protecting member is provided to an outside face of a bottom of the protecting member, and the handle is brought into contact with the position restricting portion.

9. A filter device according to claim 8, wherein the position restricting portion has an area with which the whole surface of the handle on the position restricting portion side is brought into contact.

10. A filter device according to any one of claims 1 to 9, further comprising a floating material recovery tank for recovering components having lower specific gravity out of the liquid filtered by the filter.